

REMARKS

Claims 8-16, 21-30 and 32 are presently pending. Claims 14-16, 22-24 and 28-30 have been withdrawn from consideration. Claims 8-13, 21, 25-27 and 32 have been rejected. No claims have been amended, canceled or added herein.

Rejections Under 35 U.S.C. § 103

Claims 8-13, 21, 25-27 and 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2002/0027257 to Kinsman, et al. (“Kinsman”) alone. In particular, the Office Action states, “Kinsman discloses . . . a plurality of solder bumps 20/32 (fig. 1f) . . . and a single support coating 30 (fig. 1f) . . . [that] has been fully cured . . . prior to any reflow of any of said . . . solder bumps.” Further, the Office Action states, “Note that the solder bumps are spherical, page 4, [0029]) and that the bumps are formed from a single homogenous material (page 3, [0023]).” The Office Action also concludes that “it would have been obvious . . . to modify the invention of Kinsman with specific ranges for the support coating’s height relative to the bumps.” Applicants respectfully traverse these rejections.

Applicants respectfully submit that a *prima facie* case of obviousness still has not been made with respect to the claims presented prior to the amendments made in Applicants’ last response on February 12, 2007, much less the claims as amended in that response. To establish a *prima facie* case of obviousness, a given prior art reference must teach or suggest all claim limitations, there must be a reasonable expectation of success when making a proposed modification to the prior art, and there must be some suggestion or motivation, either in the prior art itself or in the knowledge generally available to one of ordinary skill in the art, to modify a reference. *See, e.g.*, MPEP § 2143. Applicants respectfully submit that none of these three requirements are met by the obviousness rejections set forth in the Office Action. Further details and remarks regarding these contentions are provided in Applicants’

prior Response of December 11, 2006, and these details and remarks are incorporated by reference herein.

Nevertheless, amendments were made to independent claims 8, 13 and 32 in Applicants' last response in an effort to expedite prosecution. In particular, the limitation "substantially spherical" was added to define the solder bumps in claim 8, and the limitation "wherein each of said [] solder bumps is formed from a single homogenous material" was added to define the solder bumps in each of claims 8, 13 and 32. Kinsman does not teach or suggest such type of solder bumps formed from a single homogenous material that meet all other limitations of the pending claims, particularly those concerning wetting angles and a support coating having a height from 20 to 70 percent of the pre-reflow height of the solder bumps. As such, these last claim amendments clearly overcome the awkward misreading of Kinsman that its items 20 and 32 combine to form a single solder bump.

If Kinsman Solder Bumps Are a Combination of Items 20 and 32

The Office Action states that "Kinsman discloses . . . a plurality of solder bumps 20/32 (fig. 1f)." Although Applicants continue to disagree with this assertion that the combination of items 20 and 32 in Kinsman result in singular "solder bumps," as are presently claimed, such a misreading of Kinsman must be made in order to meet the other claim limitations involving wetting angles and a support coating having a height from about 20 to 70 percent of the pre-reflow height of the solder bumps. Yet, if the plurality of solder bumps of Kinsman are to be read as the combination of its items 20 and 32, as set forth in the Office Action, then these alleged "solder bumps" are neither substantially spherical nor formed from a single homogenous material. A simple review of any figure in Kinsman that depicts its items 20 and 32 shows that the combination of these items is just not spherical. Nothing in Kinsman remotely suggests that a combination of its items 20 and 32 would result in a spherical combined item.

Furthermore, Kinsman teaches that its items 20 and 32 are distinct items made of different materials. While item 32 is referred to as an “external conductive element” or “solder ball,” item 20 is called an “intermediate conductive element” such as a UBM. The only instance where Kinsman suggests that its item 20 might comprise solder is also qualified by the statement that such a solder be “of a higher melting temperature than that of another solder to be employed in external conductive elements 32.” As has also been noted in greater detail previously by Applicants, Kinsman specifically teaches that its external conductive elements 32 are to be reflowed while its intermediate conductive elements are not to be reflowed during a given reflow process. Thus, any combination of items 20 and 32 in Kinsman cannot possibly be an item that is formed from a single homogenous material.

Accordingly, any reading of Kinsman that requires its “solder bumps” to be a combination of its items 20 and 32 cannot result in Kinsman having “substantially spherical solder bumps” or “solder bumps formed from a single homogenous material,” as is presently claimed. As such, any such reading of Kinsman cannot render the pending claims as obvious for at least the reasons that such a reading would then not account for either of these material claim elements.

If Kinsman Solder Bumps Are Simply Item 32

Kinsman specifically teaches of “solder balls 32.” If the true “solder bumps” of Kinsman are limited only to its item 32, however, then there is no support coating that rises to any height of these solder bumps, and there can also be no mid-level wetting angles formed by a support layer against the solder bumps. As noted previously by Applicants, and as can be seen by many of its figures, Kinsman teaches an encapsulant material 30 that rises to 100% of the height of its item 20 and 0% of the height of its item 32.

Accordingly, any reading of Kinsman that requires its “solder bumps” to be limited only to its item 32 cannot result in Kinsman also having a single support coating “wherein the

height of said single support coating is from about 20 percent to about 70 percent of the pre-reflow height of said solder bumps,” or a single support coating formed “such that mid-level wetting angles are formed at mid-level junctions where the upper surface of said support coating meets said solder bumps,” as is presently claimed. As such, any such reading of Kinsman cannot render the pending claims as obvious for at least the reasons that such a reading would then not account for either of these material claim elements.

Basis For Modifying Kinsman

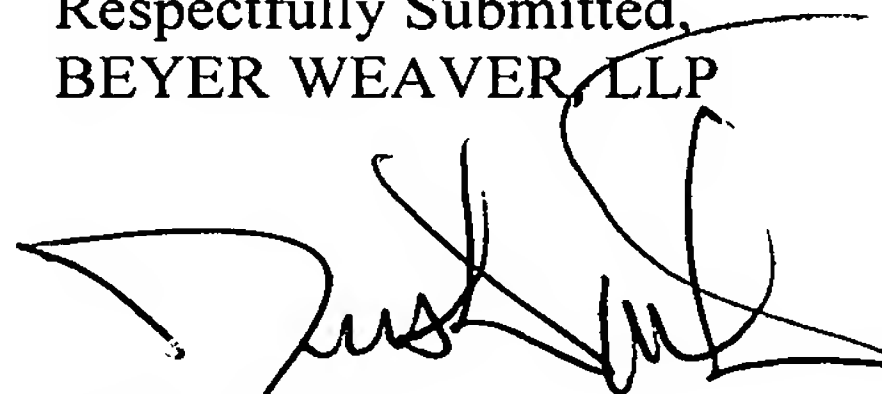
Furthermore, because Kinsman is not concerned with creating a support layer for its solder bumps, it is unreasonable to modify Kinsman in ways that do nothing to help achieve its objectives. In fact, Kinsman actually teaches away from various limitations of the pending claims, such that many of the proposed modifications are simply inappropriate. For example, the Office Action states, “it would have been obvious . . . to modify the invention of Kinsman with specific ranges for the support coating’s height relative to the bumps so as to result in the first wetting angles being at least 40-50 degrees . . .” However, Kinsman does not teach a “support layer,” but rather an “encapsulant.” This encapsulant is intended to cover the entire layer for item 20 and to cover none of item 32. As such, the height of the encapsulant 30 is dictated by the height of the layer for item 20. Further, this encapsulant layer has absolutely nothing to do with wetting angles of the solder bumps. To suggest that it would be obvious to modify the height of this encapsulant layer for reasons that have nothing to do with the teachings of Kinsman is simply wrong. There is no reason for anyone to modify the height of the encapsulant layer beyond that which is needed to encapsulate the layer of item 20.

In sum, the pending rejections simply cannot have it both ways. Either the solder bumps of Kinsman are the combination of its items 20 and 32, or they are simply item 32. Whichever way Kinsman is read in this regard, there will then be material limitations of the pending claims that are simply not met or reasonably suggested by Kinsman.

CONCLUSION

Applicants respectfully submit that all claims are in proper form and condition for patentability, and thus request a Notification of Allowance to that effect. It is believed that no fees are due at this time. If any fees are due in connection with this Response or for this application in general, however, then the Commissioner is hereby authorized to charge such fees to Deposit Account No. 50-0388, referencing Docket No. NSC1P131X3. If there are any questions or issues remaining, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

Respectfully Submitted,
BEYER WEAVER, LLP

A handwritten signature in black ink, appearing to read "Justin White", is written over the printed name and firm name.

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